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ACKENHEIL AND ASSOCIATES INC BALTIMORE MD
NATIONAL DAM INSPECTION PROGRAM. LITTLE YOUGHIOGHENY RIVER SITE--ETC(U)
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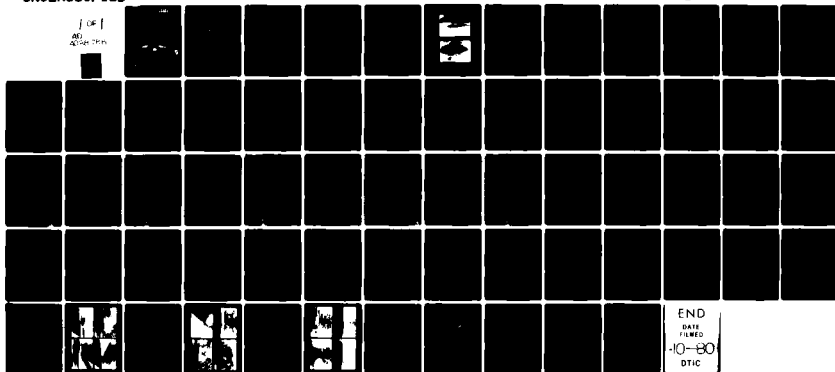
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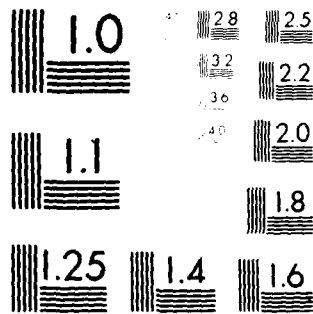
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YOUGHIOGHENY RIVER BASIN
WILSON RUN, GARRETT COUNTY

AD A088786

MARYLAND

James David/Hanley
Timothy E. Debes

LITTLE YOUGHIOGHENY RIVER SITE NO.3

NDI ID NO. MD 45

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PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

Little Youghiogheny River Site Number 3
(NDI ID Number 45)
Youghiogheny River Basin

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Wilson Run, Garrett County
Maryland. Phase I



Inspection Report

DACW 31-79-C-0038

PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

BY

ACKENHEIL & ASSOCIATES, BALTIMORE, MD, INC.
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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigation and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE 1 REPORT
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Little Youghiogheny Site No. 3
STATE LOCATED: Maryland
COUNTY LOCATED: Garrett
STREAM: Wilson Run, a tributary of the Little Youghiogheny River
DATES OF INSPECTION: April 10, 1979, and April 27, 1979
COORDINATES: Lat. 39° 25', Long. 79° 24'

ASSESSMENT OF GENERAL CONDITIONS: Based on the evaluation of available design information and visual observations of conditions as they existed on the dates of the field reconnaissances, the general condition of Little Youghiogheny Site No. 3 is considered to be good.

Wet zones, observed located at the toe of the downstream embankment, are not considered significant relative to dam stability at the present time. However, these zones should be periodically observed to determine if seepage conditions are developing.

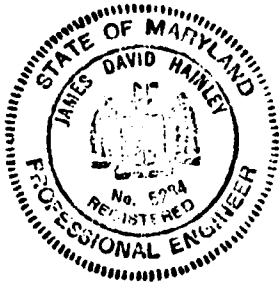
A concrete wall, designed to support the pipe outlet at the location of the plunge pool, has moved outward toward the plunge pool approximately three (3) inches. This offset is evidenced by the misalignment of the concrete form break between the keyed pipe cradle and concrete wall bent. An inspection of principal spillway outlet pipe joints is needed to determine if pipe joints have separated and exceed allowable tolerances. Periodic observation of the outlet pipe wall support system is also advised to ascertain future movement.

Little Youghiogheny Site No. 3 is classified as a "small" size, "high" hazard dam. Soil Conservation Service hydrological/hydraulic design computations indicate spillway capacity is adequate to pass 100% of the PMF. Spillway capacity is therefore in accordance with recommended guideline criteria.

The following recommendations should be implemented as soon as possible:

- 1) Inspect principal spillway outlet pipe joints. Inspection to consist of measuring pipe joint openings to check tolerance.
- 2) Monitor, by observation, wet zones located at toe of downstream embankment slope for development of seepage conditions.
- 3) Periodically observe outlet pipe wall support system for evidence of continued movement.
- 4) Develop a formal flood surveillance and warning plan.

- 5) Replace small animal guard screens on seepage outlet pipes.
- 6) Repair eroded rills, gullies, and animal burrow holes on dam embankments and abutments.
- 7) Remove wood debris from low stage trash rack.



James D. Hainley 14 June 79
 James D. Hainley, P.E. Date
 Maryland Registration No. 5284
 Vice President

Timothy E. Debes 14 June 79
 Timothy E. Debes Date
 Project Engineer

APPROVED BY: *G. K. Withers* 25 Jun 79
 G. K. WITHERS Date
 Colonel, Corps of Engineers
 District Engineer

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LITTLE YOUGHIOGHENY SITE NO. 3



Overview of Dam



View of Downstream Face

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM
LITTLE YOUGHIOGHENY SITE NO. 3
NATIONAL ID NO. MD 45

1.1 General

- a. Authority. The study was performed pursuant to the authority granted by the National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.
- b. Purpose. The purpose of this study is to evaluate if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances

- (1) Embankment. The Little Youghiogheny Site No. 3 dam consists of an earthfill embankment 655 ft. long, with a maximum toe to crest height of 31 ft., and a crest width of 13 ft. Upstream and downstream embankments slope 3H:1V and 2.5H:1V, respectively. A 10 ft. wide bench is located on the upstream slope about 19 ft. below the dam crest.
- (2) Seepage Drain System. According to as-built drawings, seepage control is provided by a filter drain system consisting of a perforated corrugated metal pipe and a sand and gravel filter trench. The trench and pipe drain system is located 30 ft. upstream from the downstream embankment toe and is extended to about 8 ft. below original ground. Seepage, collected by the 450 ft. long system, is drained through the dam embankment by a 20 ft. wide blanket drain and two (2) 6 in. dia. non-perforated corrugated metal outlet pipes.
- (3) Flood Discharge Facilities. Flood discharge facilities consist of a principal spillway riser, outlet pipe, and an emergency spillway channel. Principal spillway intake works include a 24 in. dia. corrugated metal reservoir drain inlet pipe, a low stage .75'x2.0' ft. orifice, and two (2) high stage 6 ft. wide concrete overflow weirs. The low and high stage principal spillway inlets are provided with trash racks. Principal spillway outlet works consist of an 8 in. dia. cast iron drain pipe and gate valve, and a 24 in. dia. reinforced concrete outlet pipe. The 8 in. dia. gate valve is regulated by a hand operated turn wheel and provides for non-emergency drawdown of the reservoir. Water entering the principal spillway riser flows vertically down the riser, through the concrete outlet pipe connected to the base of the intake riser, into a plunge pool. The outlet pipe plunge pool is lined with riprap and is located approximately

167 ft. downstream of the intake riser. The emergency spillway channel is cut into natural earth and is located on the north dam abutment. The spillway channel is curved, 50 ft. in width, and 350 ft. in length. Gravelly and silty clays underlie the upstream and downstream spillway channels. Spillway flow is discharged approximately 200 ft. downstream of the dam into the natural stream channel of Wilson Run.

- b. Location. Little Youghiogheny Site No. 3 is located on Wilson Run, a small, south-west flowing tributary of the Little Youghiogheny River. Wilson Run is a secondary tributary of the Youghiogheny River. The dam is situated approximately 0.5 mile northeast of Oakland, Maryland in Garrett County. (Refer to Location Plan, Appendix E.) Dam coordinates are Lat. 39° 25', Long. 79° 24'.
- c. Size Classification. Based on a maximum dam height of 31 ft. and a top of dam reservoir storage of 374 ac.-ft., the dam facility is accordingly classified in the "small" classification category.
- d. Hazard Classification. Little Youghiogheny Site No. 3 is situated within a close reach of Oakland's population center of 1,800 residents. Wilson Run flows through the south-central section of town, near Oakland's main business district. Loss of life and substantial damage to residential and commercial properties is considered a certainty in the event of a dam failure. Therefore, the dam is accordingly classified as a "high" hazard.
- e. Ownership. The Wilson Run Public Watershed Association is responsible for the operation and maintenance of Little Youghiogheny Site No. 3. The dam was constructed by easement of private properties owned by Clayton Winters and J. William Glotfelty.
- f. Purpose of Dam. The primary purpose of Little Youghiogheny Site No. 3 is to reduce downstream flooding of Oakland by providing temporary storage of runoff from 510 acres. The dam is designed to gradually release the temporary storage through a two stage principal spillway system.
- g. Design and Construction History. Little Youghiogheny Site No. 3 was designed by the Soil Conservation Service, Engineering and Watershed Planning Unit, Upper Darby, PA in 1963. Designers included J. H. Harrington, N. M. Curtis, Gerald Bowie, Kendal Jarvis, and Gerald Oman. Construction started in July 1964 under the direction of the Soil Conservation Service and was completed in June 1965.
- h. Normal Operating Procedure. The dam facility operates as an uncontrolled structure. Reservoir pool level is normally maintained at Elev. 2,416, the level of the uncontrolled low stage intake orifice of the principal spillway riser.

1.3 Pertinent Data

| | | |
|----|--|-------------------------|
| a. | <u>Drainage Area</u> | 0.8 sq. mi. |
| b. | <u>Discharge at Dam Facility</u> | |
| | Maximum known flood at dam facility | Unknown |
| | Ungated spillway capacity at design high water elevation - | 660 cfs |
| | Ungated spillway capacity at top of dam elevation | 4,020 cfs |
| c. | <u>Elevation (feet above MSL)</u> | |
| | Constructed top of dam | El. 2,436.1 |
| | Design high water | El. 2,431.0 |
| | Normal pool | El. 2,416.0 |
| | Emergency spillway crest | El. 2,428.0 |
| | Principal spillway high stage overflow weir crest | El. 2,419.5 |
| | Streambed at centerline | El. 2,404.0± |
| d. | <u>Reservoir Length</u> | |
| | Length of maximum pool | 0.45 mile |
| | Length of normal pool | 0.20 mile |
| e. | <u>Total Storage</u> | |
| | Constructed top of dam | 374 ac.-ft. |
| | Design high water | 215 ac.-ft. |
| | Emergency spillway crest | 148 ac.-ft. |
| | Principal spillway high stage | 38 ac.-ft. |
| | Principal spillway low stage | 17 ac.-ft. |
| | Normal pool level | 17 ac.-ft. |
| | Sediment pool | 17 ac.-ft. |
| f. | <u>Reservoir Surface</u> | |
| | Constructed top of dam | 37.0 acres |
| | Design high water | 25.7 acres |
| | Spillway crest | 19.5 acres |
| | Normal pool | 4.5 acres |
| | Sediment pool | 4.5 acres |
| g. | <u>Dam</u> | |
| | Type | Homogeneous earthfill |
| | Length | 655 ft. |
| | Height | 31 ft. |
| | Top width | 13 ft. |
| | Side slopes | |
| | Downstream | 2.5H:1V |
| | Upstream with 10 ft. wide bench | 3.0H:1V |
| | Impervious core | None |
| | Cutoff provisions | Compacted cutoff trench |
| | Grout curtain | None |

h. Regulating Outlet

| | |
|----------------------------------|---|
| Type | Concrete intake structure and 24 in. dia. R.C. outlet pipe |
| Riser height | 15 ft. |
| Riser Dimensions | 4 x 8 ft. |
| Length of connecting outlet pipe | 167 ft. |
| Gates | 8 in. dia. gate valve, Crane Model No. 461 |

i. Spillway

| | |
|--------------------|--|
| Type | Earth |
| Width | 50 ft. |
| Crest elevation | 2,428.0 ft. MSL |
| Gate | None |
| Upstream channel | Vegetated earth with a negative 1% slope |
| Downstream channel | Vegetated earth with a positive 2.1% slope |
| Length of channel | 350 ft., curved |

SECTION 2 DESIGN DATA

2.1 Design

a. Data Available

- 1) Hydrology and Hydraulics. Design information was obtained from Soil Conservation Service design report, Little Youghiogheny Site No. 3, dated April 3, 1963. The design information consists of hydrological calculation summaries, flood hydrographs, discharge calculations, and rating curves.
- 2) Embankment. Available information includes design drawings and calculations, construction specifications, geologist's report, and laboratory soil test data. Information obtained from report identified in Section 2.1-a(1) and Construction and Material Specifications for Little Youghiogheny River Watershed Flood Detention Structure No. 3, prepared by U. S. Department of Agriculture.
- 3) Appurtenant Structures. Design information includes detailed structural design calculations, design drawings, and construction specifications. All available information was obtained from the reports identified in Section 2.1-a(2).

b. Design Features. Principal features of the dam embankment and appurtenant structures are illustrated on Plates 1 through 5. A description of design features is also discussed in Section 1.2, "Description of Project". Dam and appurtenant structures are designed in accordance with Soil Conservation Service, structure classification "C" criteria.

- 1) Embankment. The dam embankment was designed as a homogeneous earthfill structure. According to design documents, sandy and silty clays were predominately used to construct the embankments. All earthfill material was obtained from within reservoir site limits. The dam embankment overlies the Jennings Formation, which consists of thin-bedded sandstones, siltstones, and shales. A cutoff trench, located along the centerline of the dam, is constructed eight (8) ft. below the original stream elevation and is keyed into the Jennings Formation. The cutoff trench has a base width of 10 ft., side slope inclinations of 1H:1V, and is constructed of clay earthfill. Details of the dam embankment and cutoff trench are shown on Plates 1, 2, and 4.

- (2) Seepage Drain System. According to as-built drawings, filter trench width and height dimensions range from a minimum of 4 x 5 ft. to a maximum of 4 x 12 ft., respectively. The filter trench was excavated until bedrock was encountered. Perforated metal pipe, installed to collect and transport seepage water, is located in the top section of the sand and gravel filter trenches, about 2 ft. below the original ground elevation.

The north and south filter trench extensions connect with the blanket drain and outlet toe drains at the location of the 24 in. dia. concrete outlet pipe, 35 ft. upstream from the downstream embankment toe. At this junction, a clay plug, constructed beneath the blanket drain, provides support for the concrete outlet pipe and cradle. This clay plug blocks drainage from the lower half of the connecting filter trenches.

- (3) Flood Discharge Facilities. Details of the intake riser, outlet pipe, and spillway channel are shown on Plates 1, 4, and 5.

The principal spillway riser is 15 ft. in height, 4 x 8 ft. in dimension and includes an anti-vortex device consisting of a concrete cantilever roof slab. Trash rack provisions include a steel reinforcement bar and angle iron cage for the low stage orifice, and two (2) galvanized pipe cross-pieces for each high stage overflow weir.

The outlet pipe is constructed with four (4) equally spaced anti-seep collars and a concrete support cradle through the dam embankment. A keyed concrete cradle and wall system supports the pipe outlet at the location of the plunge pool.

The emergency spillway consists of a trapezoidal natural earth channel with 2H:1V side slopes. The upstream spillway channel is inclined on a negative 1% slope, the downstream channel a positive 2.1% slope.

- 2.2 Construction. Based on the available design documents and field observations, it may be concluded the dam was constructed in general accordance with the intended design drawings and specifications. Based on review of as-built drawings, there was no apparent evidence to indicate unusual construction difficulties were encountered during the construction of the dam.

- 2.3 Operation. The Wilson Run Public Watershed Association, Oakland, MD, is responsible for the maintenance and operation of the dam.

There are no formal operating procedures. The principal and emergency spillways are uncontrolled structures. The only operational feature of the dam is a gate valve used to regulate the drawdown of the reservoir pool for non-emergency purposes. This gate valve is normally closed.

2.4 Evaluation

- a. Availability. All available design information and drawings were provided by the Dam Safety Division, Maryland Water Resources Administration and the Soil Conservation Service.
- b. Adequacy. The design data provided is reasonably documented and is considered adequate to evaluate the dam and appurtenant structures in accordance with the scope of a Phase 1 study.
- c. Validity. At this time, there is no observed evidence or reason to question the validity of the available design information and drawings.

SECTION 3 VISUAL INSPECTION

3.1 Findings

- a. General. The on-site reconnaissance of Little Youghiogheny Site No. 3 consisted of:
1. Visual observations of the earth embankment, abutment, and spillway structures.
 2. Visual observation of exposed sections of the concrete principal spillway riser, control valve mechanisms, outlet pipe, reservoir, and plunge pool.
 3. Visual observations of discernible hazardous conditions or safety deficiencies.
 4. Evaluation of the downstream hazard potential.

Visual surveys were performed during periods when reservoir and tailwater were at normal pool levels.

The complete visual observation check list and field sketch are given in Appendix A.

In general, visual observations indicate the dam is adequately maintained and in good condition at the present time.

b. Embankment

- (1) Embankment Surface. Grass cover on embankment slopes is thick and about 1.5 ft. in height. The dense grass cover may have masked slight bulging or sloughing of embankment slopes. However, no significant evidence of distortion, misalignment, or sloughing was observed.
- (2) Erosion. Minor rill erosion, about 0.2 ft. in depth, was found on dam abutment and spillway junctions. The erosion is considered attributable to surface drainage. A network of animal burrow holes was observed in abutment junctions and in the downstream embankment slope. This network of animal burrow holes has developed into eroded gullies. The downstream embankment also has "pitted", irregular gullies transversing much of the lower half of the slope. Presumably, these gullies are due to past grazing activities and subsequent erosion by surface runoff.
- (3) Wet Zone. Wet zones were observed near the vicinity of the plunge pool and along the downstream embankment toe. (Refer to field sketch for approximate locations.) The wet zones are thoroughly saturated and very soft. These zones

are situated in a topographic low and are subject to surface drainage and seepage from the 20 ft. wide blanket drain. The extent of these zones along the downstream embankment toe generally approximates the width of the reservoir pool on the upstream slope.

c. Appurtenant Structures

- 1) Emergency Spillway. Emergency spillway channel bottoms and side slopes are vegetated with grass and appear stable. The spillway inlet and outlet channels are free of flow obstructions and debris. (See Photographs 9, 10, & 11.)
- 2) Principal Spillway Riser. There was no observed evidence of cracking or spalling on exposed concrete surfaces. The low stage trash rack cage and high stage galvanized pipe crosspieces were also observed in good condition. A small amount of wood debris was noted obstructing the low stage trash rack. The 8 in. dia. gate valve was exercised and found to be in adequate operating condition. The stem and collar guides appeared greased, but were slightly rusted in condition. (See Photograph 4.)
- 3) Outlet Works. A concrete wall, designed to support the outlet pipe at the location of the plunge pool, has moved outward toward the plunge pool approximately three (3) inches. This offset is evidenced by the misalignment of the concrete form break between the keyed pipe cradle and concrete wall bent. Exposed pipe and concrete cradle surfaces were observed in good condition with no spalling or cracking evident. (See Photographs 5 & 6.)

Small animal guard screens are missing from the seepage drain pipes. The protective bituminous coating on the corrugated drain pipes appears to be slowly deteriorating and has already exposed bare metal surfaces. Both drain pipes had a clear discharge at the rate of about 1 gpm.

- d. Reservoir Area. Reservoir slopes are relatively flat and primarily consist of open pasture and croplands. The slopes are well vegetated and there was no observed evidence of shoreline erosion or slope instability. Reservoir water and discharge from the outlet pipe showed no discernible evidence of siltation or turbidity.

The stream feeding the reservoir is cobble lined, stable, and reportedly transports limited quantities of silt.

- e. Downstream Channel. The downstream channel is about 8 ft. in width, and was observed free of debris, vegetation, and other

flow obstructions. Erosion of stream side slopes is occurring immediately downstream of the plunge pool. Channel side slopes are partially covered with grass and slope approximately 4H:1V. Channel bottoms are cobble lined and appear stable. (See Photograph 8.)

A 4 in. dia. cast iron drain pipe exits on the south side of the plunge pool. The pipe is reportedly connected to a tile drain system which was installed to drain springs located downstream of the dam embankment. Discharge emanating from the drain pipe was estimated at the rate of about 0.5 gpm. A description of downstream channel conditions is also discussed in Section 5.1(f).

3.2 Evaluation

- a. Embankment. In general, the dam embankment is adequately maintained and appears in good condition. The observed surficial deficiencies, consisting of eroded gullies and animal burrow holes, are not considered to represent a significant hazard to the safety of the dam as they presently exist. The observed wet zones, located at the toe of the downstream embankment, are also not considered significant at the present time. However, these wet zones should be periodically observed by the owner to determine any change in conditions.
- b. Appurtenant Structures. Continued movement of the outlet pipe support wall may open pipeline joints. In the event pipe joints open, some internal erosion of the sandy and silty clay embankment soils may occur. This erosion may become significant enough to affect the stability of the outlet pipeline. Insufficient data is available at the present time to ascertain the exact cause of the support wall movement or condition of pipe joints. An immediate inspection should be made of pipeline joints to determine if pipe joints have separated and exceed allowable tolerances. Periodic observation of the outlet pipe support wall is also advised to ascertain future movement. The general condition of the outlet pipe and wall support system is therefore considered fair.

The principal spillway riser and emergency spillway channel are considered to be in good condition.

SECTION 4 OPERATIONAL FEATURES

- 4.1 Procedure. Normal operating procedure does not require a dam tender. Reservoir level is normally maintained by the uncontrolled low stage orifice of the principal spillway structure. The only operational feature of the dam is a gate valve used to regulate the drawdown of the reservoir for non-emergency purposes.
- 4.2 Maintenance of Dam. Dam embankment and appurtenant structures are maintained by the Wilson Run Public Watershed Association with the assistance of the Soil Conservation Service. Maintenance usually consists of cutting grass, repairing worn footpaths and eroded gullies, removing trash from dam premises, and clearing debris from the trash racks. Maintenance is generally performed on an annual basis.
- 4.3 Inspection of Dam. Operation and maintenance inspections are usually performed on an annual basis by the Soil Conservation Service, at the request of the Wilson Run Public Watershed Association. The inspections generally consist of visually examining the dam embankment, appurtenant structures, reservoir area, and outlet channel, and providing recommendations for needed remedial repairs.
- 4.4 Maintenance of Operating Facilities. According to Soil Conservation Service personnel, the 8 in. dia. gate valve is infrequently maintained and exercised. On the date of the field reconnaissance, the gate valve was operable.
- 4.5 Warning Systems in Effect. There is no warning system or formal emergency procedure to alert or evacuate, as necessary, downstream residents in the event or threat of a dam failure.
- However, the local Soil Conservation Service district office indicated it will initiate appropriate safety measures, should the threat of high flood flows or a dam failure develop.
- 4.6 Evaluation. In general, maintenance and inspection procedures at the dam site are assessed adequate. However, a formal flood surveillance and warning plan is needed for the protection of downstream residents.

SECTION 5
HYDROLOGY/HYDRAULICS

5.1 Evaluation of Features

- a. Design Data. The Little Youghiogheny Site No. 3 reservoir has a normal pool volume of 17 ac.-ft. and a surface area of 4.5 acres. Watershed cover complex consists predominantly of open pasture and croplands. The watershed is approximately 510 acres in area, and ranges in relief from Elev. 2,610 to Elev. 2,416 at normal pool level. Hydrology analyses were based on Soil Conservation Service, structure classification "C" criteria. No upstream dams or lakes were observed or were evident on photorevised quadrangle maps.

The principal spillway low stage orifice is designed to pass normal base flow and is set at the anticipated 50 year sediment level. High stage overflow weirs are set at the maximum stage level of the 10 year frequency storm and can pass the 100 year frequency flood runoff. The emergency spillway control crest is set at the maximum stage level of the 100 year frequency storm, and is activated when runoff exceeds 3.5 inches. Top of dam was established at El. 2,436 by routing the storm of record (March 1936) and adding 7.4 ft. of freeboard to meet Maryland State requirements.

The dam facility is classified as a "small" size, "high" hazard dam. Based on this classification and visual observation of downstream conditions, the PMF was selected as the required spillway design flood.

Top of dam and spillway hydraulic capacity were sized to pass a flood corresponding to 23.0 in. of runoff in 6 hours. Soil Conservation Service flood routing data indicates this flood runoff will produce a peak inflow of 6,143 cfs, of which 4,020 cfs will be passed by the emergency spillway.

The reviewed Soil Conservation Service hydrological/hydraulic design information is in accordance with accepted engineering practice and is considered to be adequate for the scope of a Phase 1 study.

- b. Experience Data. Records are not kept of reservoir level elevations or rainfall amounts. The storm of record for this area occurred in March 1936. Soil Conservation Service routing calculations indicate if the dam had been constructed at that time, the maximum flood stage would have been Elev. 2,433 or 3.1 ft. below top of dam. Reportedly, the emergency spillway channel has not been activated by flood flows to date.
- c. Visual Observations. As noted in Section 3.1-c(3), the outlet pipe wall support system has moved. There is concern that continued movement may open pipe joints and adversely affect pipeline stability and hence the discharge functioning of the pipe.

On the dates of the visual surveys, no evidence was observed of conditions that would prevent the emergency spillway to function as designed.

- d. Overtopping Potential. As noted, the required spillway design flood for Little Youghiogeny Site No. 3 is the PMF. Hydro-meteorological Report No. 33 indicates the adjusted 6 hour PMF direct rainfall for the subject site area is 21.5 inches.

The emergency spillway channel is sized to pass a flood corresponding to 23.0 inches of runoff in 6 hours without overtopping the dam embankment. Therefore, based on a comparison of the presented data, it is considered unlikely the dam embankment will be overtopped.

- e. Spillway Adequacy. Based upon the previously developed data, reservoir storage and spillway capacity is adequate to pass the PMF (100%). Therefore, the dam and spillway facilities are in accordance with the required criteria set forth for "small" size, "high" hazard dams.

- f. Downstream Conditions. The outlet pipe plunge pool empties into the original stream bed of Wilson Run. Wilson Run has a gradient of about 1 percent and a natural channel width of about 8 ft. Approximately 4,500 ft. downstream of the dam, Wilson Run and the Little Youghiogeny River form a confluence.

Immediately below the dam, Wilson Run underpasses Eighth Street through a 48 in. dia. reinforced concrete pipe. This paved overpass, located 300 ft. downstream, will likely be inundated during high flood flows. Wilson Run then flows through concrete underground culverts and open channels as it traverses downtown Oakland. In the event of a dam failure, about sixteen (16) residential and commercial establishments will likely be damaged or destroyed, with loss of life probable.

SECTION 6 STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

- (1) Embankment. The observed wet zones, described in Section 3.1 may have a detrimental effect on the structural stability of the dam, should these zones develop into a seepage condition. If seepage conditions develop, a study should be implemented to monitor seepage flow and evaluate the significance to dam stability. In general, based on the visual appearance of the dam embankment, the structural performance and stability of the embankment is considered to be good at the present time.
- (2) Principal and Emergency Spillways. Visual observations of the emergency spillway channel and exposed sections of the principal spillway riser did not reveal evidence of structural inadequacies or signs of distress that would significantly affect their performance. Surficial deficiencies, described in Section 3, are not considered detrimental to the stability of these dam appurtenances.
- (3) Outlet Pipe Support System. As identified in Section 3, the concrete wall system supporting the outlet pipe has moved about 3 inches. There is concern that continued movement of the wall support system may open pipe joints and affect pipeline stability. An inspection of pipeline joints is advised to determine if pipe joints have separated and exceed allowable tolerances.

- b. Design and Construction Data. The design of the dam embankment was based on limited soil test data. One (1) undisturbed soil sample was obtained to perform a consolidated drained triaxial shear test of the foundation materials. One (1) remolded sample was used to determine the consolidated undrained shear strength of the proposed embankment fill materials. Saturated shear strength parameters of $\phi = 6^\circ$, $c = 675$ psf and $\phi = 15^\circ$, $c = 475$ psf were respectively obtained for undisturbed and remolded samples. These saturated shear strengths appear reasonable for the silty clay and sandy and silty clay materials they represent.

The modified Swedish Circle method was used to analyze the stability of the upstream and downstream embankment slopes. The analyses considered a homogeneous embankment with a phreatic surface sloping from the emergency spillway crest elevation to the downstream embankment toe. Based on these assumed conditions, and data from six (6) trial circles, a minimum factor of safety against shear failure of 1.59 was obtained. Due to the limited number of trial circles calculated, critical factors of safety may not have been obtained.

No documents or references were found to indicate seepage analyses were performed.

Basic structural design components of the principal spillway riser were reviewed for adequacy. Based on a review of available design documents and visual observations, the principal spillway structure is assessed structurally adequate.

- c. Operating Records. Operating records are not maintained at the dam facility. However, the structural stability of the dam embankments and appurtenant structures is not considered to be affected by the operation of the gate valve.
- d. Post-Construction Changes. There are no reports or discernible evidence of post-construction changes made at this dam facility. There is no record of unsatisfactory conditions having developed at the dam site requiring major remedial repairs.
- e. Seismic Stability. The dam is located in a Seismic Zone 1 area and the static stability of the dam is considered to be adequate. Earthquake loadings were not considered in the stability analysis presented in the design report.

Based on visual observations, static stability factors of safety and criteria for the evaluation of seismic stability of dams, the dam embankment is presumed to be adequate under earthquake conditions.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation

- (1) Embankment. The wet zones, located at the toe of the downstream embankment, are not considered to be significantly relative to the overall performance of the dam at this time. However, the stability of the dam may be affected should seepage conditions develop. If seepage conditions develop, a study should be implemented to monitor seepage flow and evaluate the significance to dam stability. In general, the dam embankment was observed stable and is considered to be in good condition.
 - (2) Principal and Emergency Spillways. Based on a review of design documents, as-built drawings, and visual observations of conditions as they existed on the dates of the field reconnaissances, the principal and emergency spillways are assessed in good condition.
 - (3) Outlet Pipe and Support Wall. Continued movement of the outlet pipe support wall may open pipeline joints. In the event of pipe joints opening, some internal erosion of the sandy and silty clay embankment soils may occur. This suspected internal erosion may affect pipeline stability. Therefore, it is recommended an inspection be made of pipeline joints to determine if pipe joints have separated and exceed allowable tolerances. Periodic observation of the wall support system is also advised to ascertain future movement.
 - (4) Flood Discharge Capacity. The hydrological/hydraulic design computations reviewed in this study indicate the dam can pass the PMF (100%), the required spillway design flood, without overtopping the dam embankment. Therefore, the emergency spillway system is considered adequate and in accordance with recommended guideline criteria.
- b. Adequacy of Information. The design information and drawings available for this review were of sufficient detail to adequately conduct a Phase 1 study.
- c. Necessity for Further Investigation. As previously stated, it is recommended an immediate inspection be made of pipeline joints. This investigation should consist of measuring pipeline joint openings to determine if movement of the outlet pipe support wall system has separated pipeline joints beyond allowable tolerances. The scope of this recommended inspection is beyond the intended scope of a Phase 1 investigation.

- d. Urgency. The following recommendations should be implemented as soon as possible.

7.2 Recommendations/Remedial Measures. The following recommendations are presented based on the data obtained.

a. Dam and Appurtenant Structures

- (1) Inspect principal spillway outlet pipe joints. Inspection to consist of measuring pipe joint openings to check tolerance.
- (2) Monitor wet zones located at toe of downstream embankment slope for change in conditions. If seepage conditions develop, obtain services of registered professional engineer, experienced in design of small dams, to monitor seepage, including recommendations for installation of appropriate instrumentation as conditions warrant.
- (3) Backfill, tamp, and resod eroded rills, gullies, and animal burrow holes located on dam embankments and abutments.
- (4) Replace small animal guard screens on seepage outlet pipes.
- (5) Remove wood debris from low stage trash rack.

b. Operation and Maintenance Procedures

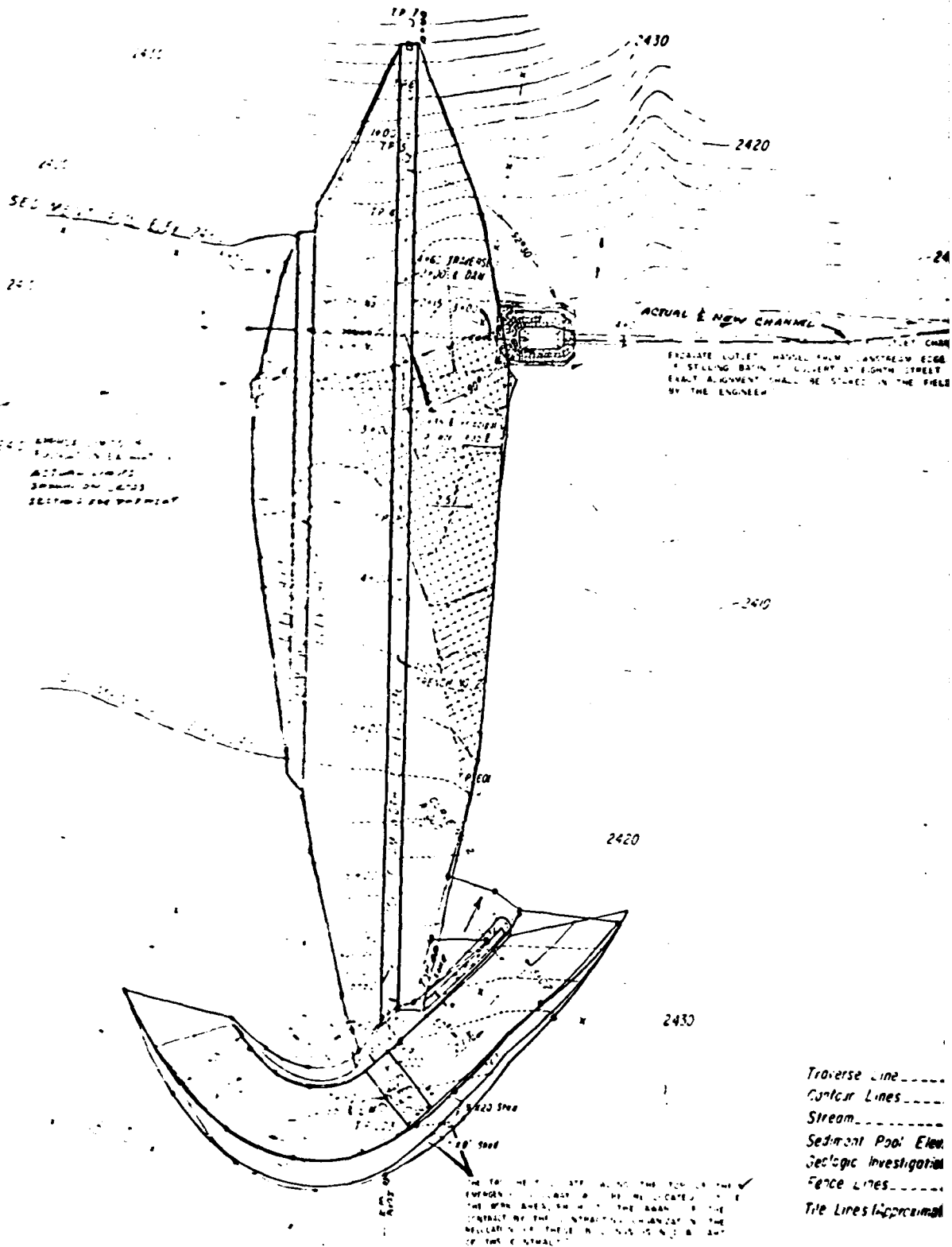
- (1) Develop a flood surveillance and warning plan. Plan to include, but not limited to, the following:
 - (a) Surveillance. Around-the-clock surveillance of dam embankments, reservoir levels, and spillway channels during periods of unusually heavy rainfall and flood discharge.
 - (b) Warning System. Formal warning procedures and system to alert downstream residents in the event of expected high flood flows.
 - (c) Evacuation Plans. Adequate emergency contingency plans to evacuate downstream residents in the event or threat of a dam failure.
- (2) Develop a more thorough and active maintenance and inspection program at the dam facility. Program should include:
 - (a) Frequent maintenance and exercising of the reservoir drain gate valve.
 - (b) Observation monitoring of the outlet pipe support wall system for evidence of continued movement.
 - (c) Observation monitoring of the erosion occurring on downstream channel stream banks.

PLATES

THESE LINES ARE BASED ON THE DATA
 AVAILABLE AT THE TIME OF THE SURVEY
 AND ARE NOT TO BE CONSIDERED AS
 FINAL OR GUARANTEED.

THESE LINES WERE REPRODUCED

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 Contour Lines
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 Sediment Pool Elev.
 Geologic Investigation
 Fence Lines
 Tile Lines (approximate)

| DATA FOR CURVE NO. | | |
|--------------------|------------------|----------------|
| STATION | DEFLECTION ANGLE | CHORD DISTANCE |
| 1+65 | 0 | 0 |
| 1+45 | 7° 38' | 3.32 |
| 1+25 | 15° 7' | 39.54 |
| 1+05 | 22° 55' | 58.6 |
| 0+85 | 30° 34' | 75.24 |
| 0+65 | 38° 2' | 92.75 |
| 0+472 | 45° 30' | 108.17 |

Curve No. 1 Sta 0+472 To 1+65 Layrad From Sta 1+65

| DATA FOR CURVE NO. 2 | | |
|----------------------|------------------|----------------|
| STATION | DEFLECTION ANGLE | CHORD DISTANCE |
| 3+02 | 0 | 0 |
| 3+22 | 2° 52' | 2.100 |
| 3+42 | 5° 44' | 33.36 |

Curve No. 2 Sta 3+02 To 3+42 Layrad From Sta 3+02

EIGHTH ST

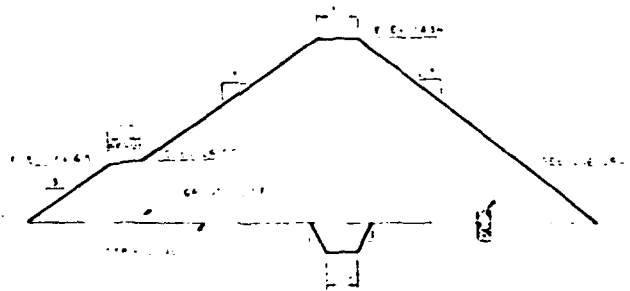
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NOTE:

PLACE SILT & CLAY (CL-MU) MATERIAL REPRESENTED BY LOSS OF TRIOS FROM 0' TO 90'. TRIOS FROM 18' TO 36'. TRIOS FROM 76' TO 96' IN CENTER PORTION OF FILL - CLASS B-2 COMPACTED FILL.

PLACE CLAYEY GRAVEL & SAND, (GC-SC) MATERIAL, REPRESENTED BY LOSS OF TRIOS FROM 36' TO 61'. TRIOS FROM 40' TO 80' IN OUTER PORTION OF FILL - CLASS B-2 COMPACTED FILL.

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BANK CUT FILLING



TYPICAL SECTION OF DAM
SEE "CROSS SECTIONS FOR TAILMENT"
FOR "AS BUILT" DIMENSIONS. ALL CROSS
SECTIONS EQUAL OR EXCEED DESIGN
CROSS SECTION.

LEGEND

AS BUILT

SCALE IN FEET
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Line
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Approximate

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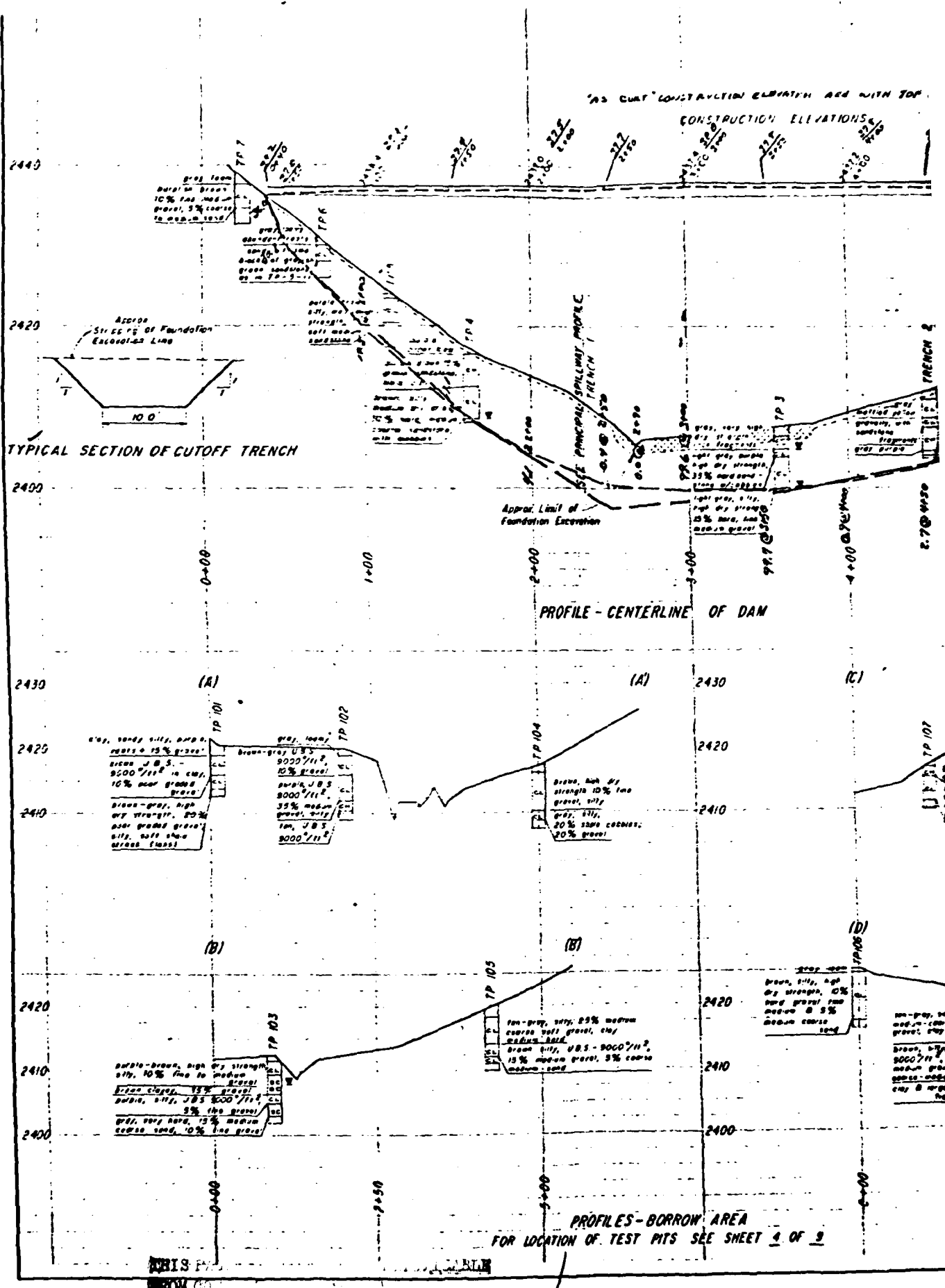
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PLATE NO. 1

DAM SITE-CURVE DATA
LITTLE YOUGHIOGHENY WATERSHED
GARRETT COUNTY, MARYLAND
RESERVOIR NO. 3

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

| | | | |
|---------------------------------|------|-------------------------|-----------|
| Designed by J. H. Harrington | Date | Drawn by E. L. March | Date |
| Checked by Gerald Bowie | Date | Scale | Sheet No. |
| | | VD - 415 P | |



TYPICAL SECTION OF CUTOFF TRENCH

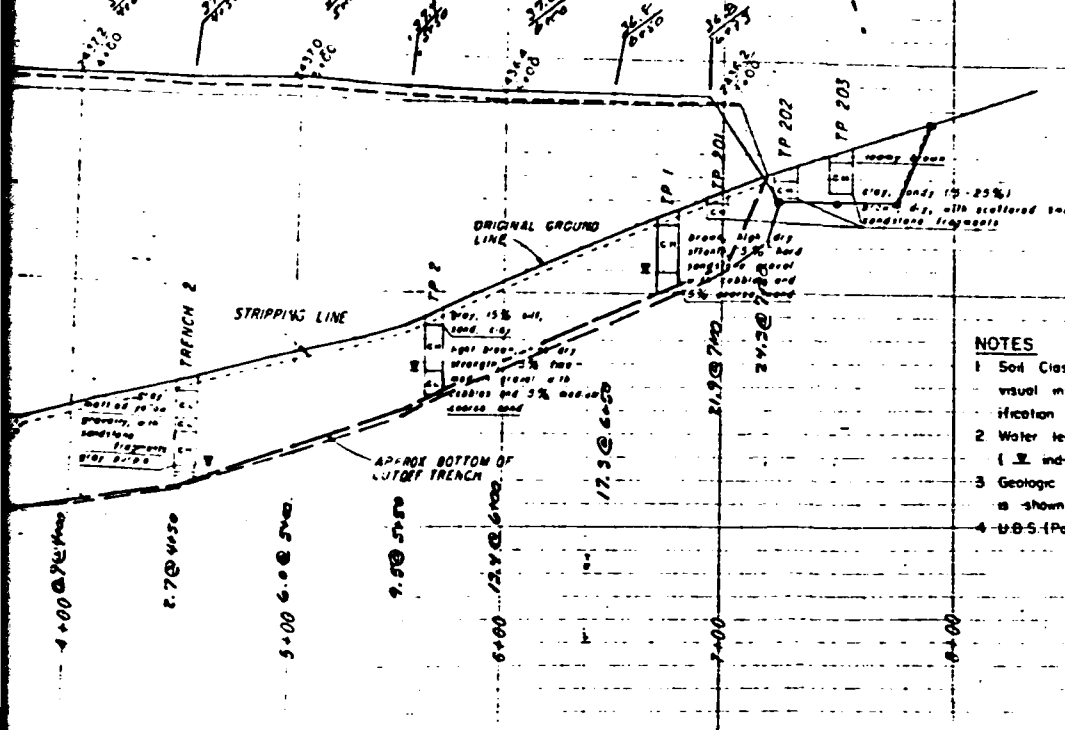
PROFILE - CENTERLINE OF DAM

PROFILES - BORROW AREA
FOR LOCATION OF TEST PITS SEE SHEET 4 OF 9

THIS PLAN IS TO BE USED FOR THE LOCATION OF TEST PITS SEE SHEET 4 OF 9

ARE WITH TOP SOIL IN PLACE ON LAM

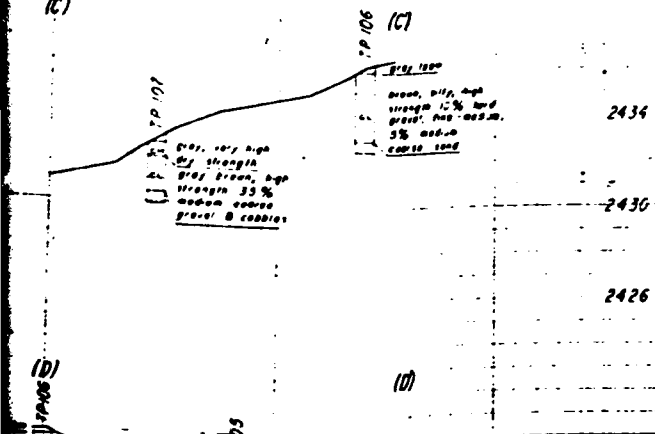
ELEVATIONS



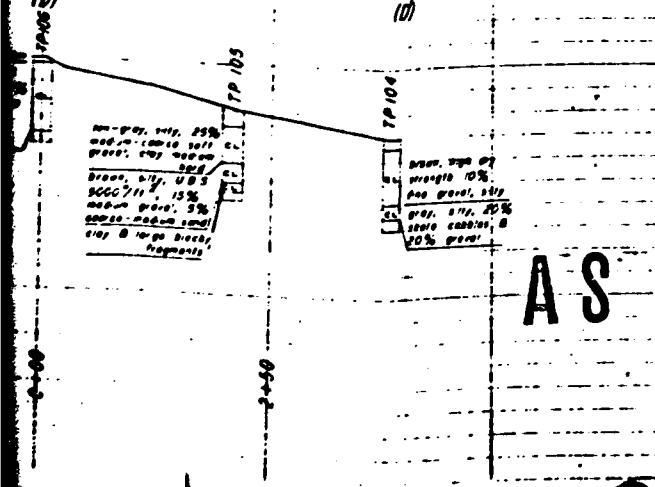
NOTES

- 1 Soil Classifications determined in the field by visual inspection using Unified Soils Classification System
- 2 Water level measurements taken on 5-21-62. (X indicates water level)
- 3 Geologic information along Principal Spillway is shown on Sheet 1 of 2
- 4 U.S. (Pocket Penetrometer Readings)

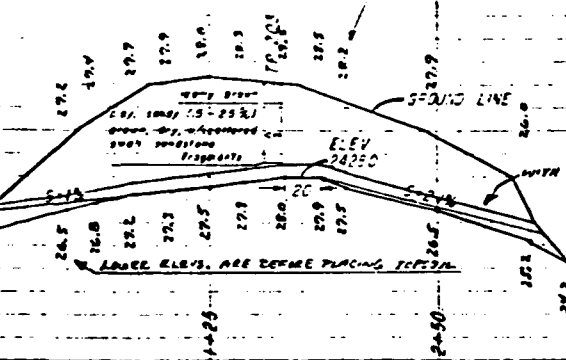
(C)



(D)



UPPER ELEV. ARE WITH TOPSOIL IN PLACE



SCALE: HORIZ. 1"=20' VERT. 1"=4'
PROFILE - CENTERLINE OF EMERGENCY SPILLWAY

AS BUILT

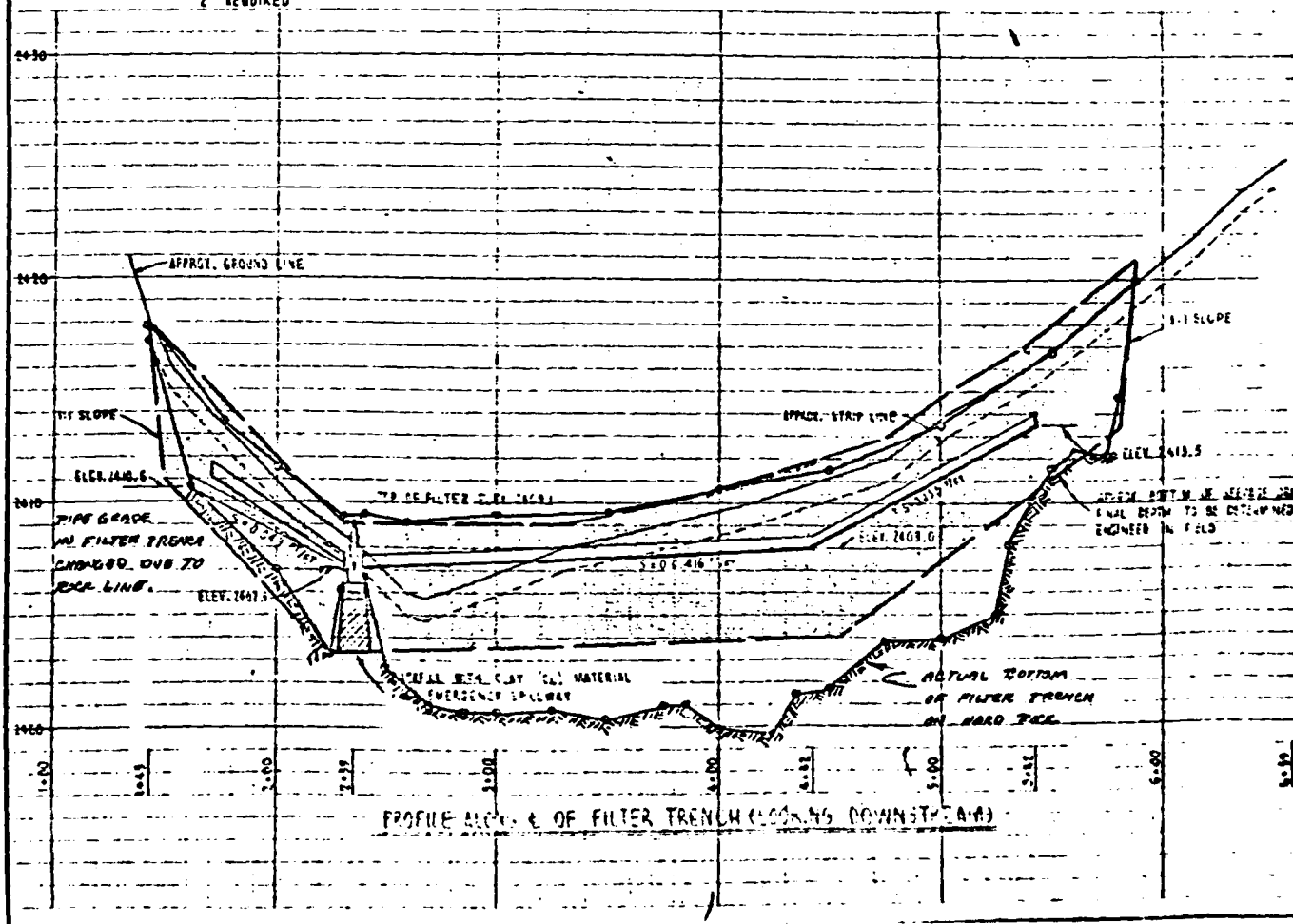
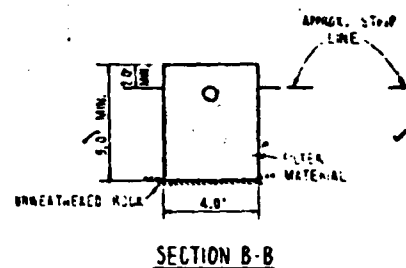
PLATE NO. 2

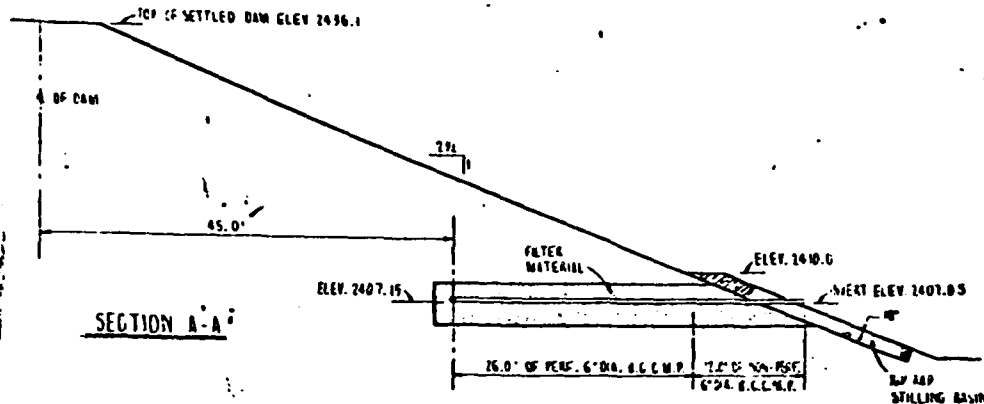
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|---|--------------|
| PROFILES & GEOLOGIC INFORMATION LITTLE YOUGHIOGHENY WATERSHED GARRETT COUNTY, MARYLAND RESERVOIR NO. 3 | |
| U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE | |
| BY N. M. Curtis | DATE 4/65 |
| BY G. Voiz | |
| BY Fred B. Flanner | MD - 415 P |

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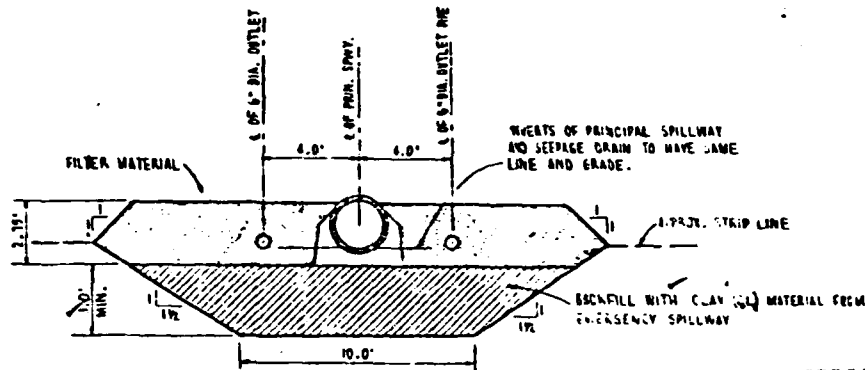
1. THE SEEPAGE DRAIN PIPES (PERF. AND NON-PERF.) SHALL BE 8" DIA. ANNULAR 10 GAUGE BITUMINOUS LINED CORR. METAL PIPE WITH STAGGED COUPLING BANDS.

20.0' LF PERK. AND 12.0' OF NON-PERK
6" DIA. B.C.G.M.P. ON EACH SIDE OF
PRINCIPAL SPILLWAY

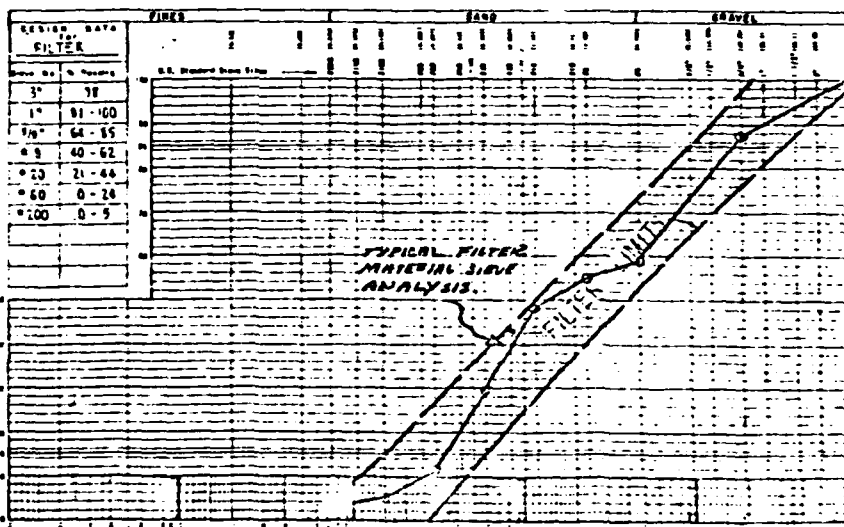




SECTION A-A



SECTION D-D THIS PAGE IS BEST QUALITY PRACTICABLE FROM COPY FURNISHED TO BDC



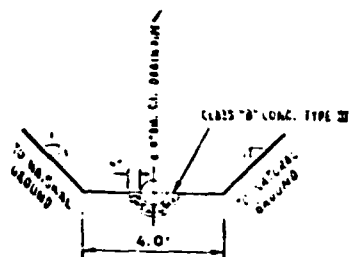
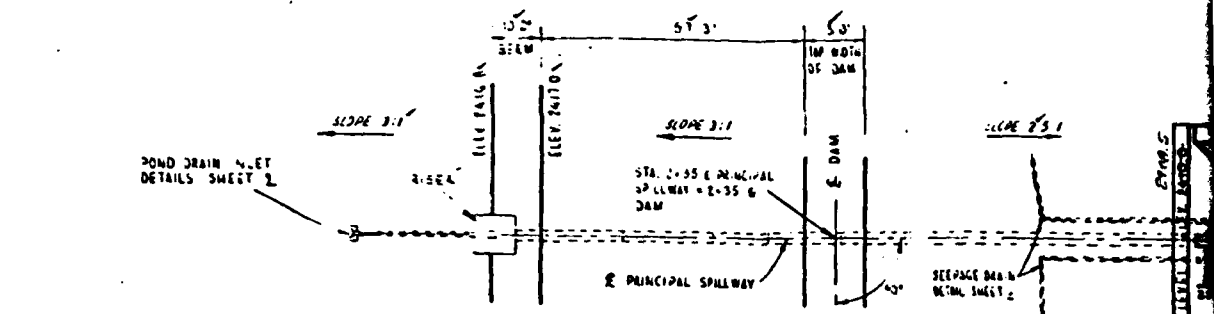
AS BUILT

SEEPAGE DRAIN DETAILS
LITTLE YOUGHIOGHENY WATERSHED
GARRETT COUNTY, MARYLAND
RESERVOIR NO. 3

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DESIGNED BY
Gerald Bowie 7/23
CHECKED BY
W. H. MORGAN MAR 65
DRAWN BY
F. J. D. 10-2150

PLATE NO. 3



FIELD STUDY STRIPS

1. FIELD STUDY STRIPS 1" x 2" x 1/4" ARE TO BE INSTALLED AT ENDS OF EACH SECTION OF DAM. EXACT LOCATIONS FOR INSTALLATION WILL BE MARKED BY THE ENGINEER.

2. STRIPS WILL BE USED TO SECURE STRIPS TO PIPE.

3. METAL STRIPS WILL BE SECURED TO PIPE SECTIONS PRIOR TO INSTALLATION OF PIPE LINE. PIPE SECTIONS SHALL BE INSTALLED SO THAT THE CENTER OF THE STRIP WILL BE ALONG THE INVERT OF THE PIPE LINE.

4. NO STRIPS WILL BE MADE FOR INSTALLING FIELD STUDY STRIPS, BUT THEY WILL BE CONSIDERED SUBSIDIARY TO OTHER ITEMS.

| STRIP NUMBER | DISTANCE BETWEEN "X" MARKS ON STRIPS |
|--------------|--------------------------------------|
| 1 | NO STRIP PLACED |
| 2 | 4 1/16 INCHES |
| 3 | 4 1/16 " |
| 4 | 4 1/16 " |
| 5 | 5 1/8 " |
| 6 | 5 1/8 " |
| 7 | 5 1/8 " |
| 8 | 5 1/8 " |
| 9 | 4 1/16 " |
| 10 | 5 1/16 " |
| 11 | NO STRIP PLACED |

MEASUREMENTS OF DISTANCES BETWEEN "X" MARKS MADE ON 10-9-64 AND STRIPS IN PLACE.

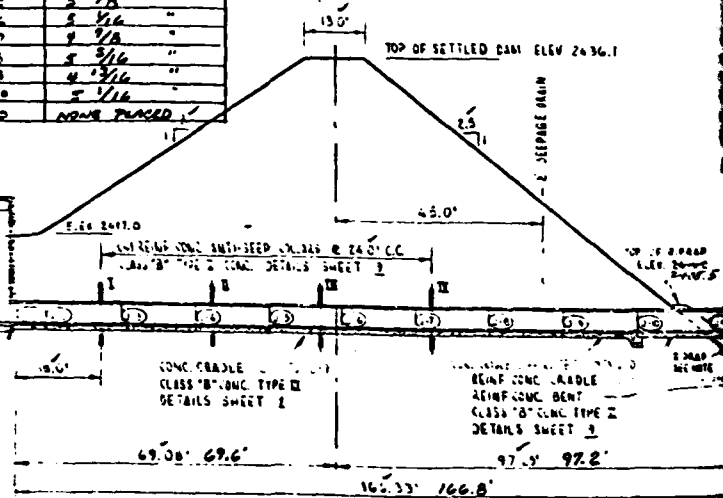
DRAIN PIPE - CONC. BED 4.0' & EXCAVATION DETAIL

ASINF CONC. RISE CLASS "B" CONC. TYPE II DETAILS SHEET 2

POUND DRAIN INLET DETAILS SHEET 2
CONC. BASE CLASS "B" TYPE II CONC. TYPE II
ELEV 2408.0

DRAIN PIPE - CONC. BED 4.0' CLASS "B" CONC. TYPE II SEE DETAIL
1" DIA. RISE IN PIPE SECTION
MIN. 1" DIA. RISE IN PIPE SECTION
MIN. 1" DIA. RISE IN PIPE SECTION

NOTE
REFERENCE FOR CAST IRON PIPE & FITTINGS:
MANUAL OF CAST IRON PIPE & FITTINGS
CAST IRON PIPE RESEARCH ASSOCIATION



ZONE A CLAY
BROWNISH YELLOWISH GRAY MUD ST. SUBSILICIOUS SILICIOUS FRAGMENTS UP TO 2" COMPRISE UP TO 35% OF SECTION. 10% SAND UP TO 10% CLAY ON AT 10% CLAY.

ZONE B CLAY
PURPLE, MOTTLED YELLOW, MUD ST. 10-20% SILICIOUS FRAGMENTS UP TO 2" SAND UP TO 10% CLAY.

ZONE C CLAY
LIGHT GRAY, YELLOW MOTTLED UP TO 20% SAND. STONE.

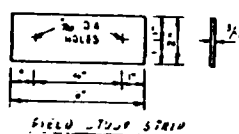
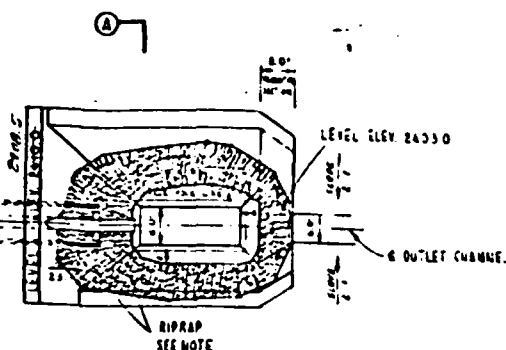
ZONE D CLAY
BL. GRAY, MOTTLED YELLOW, MUD ST. 10% SILICIOUS FRAGMENTS.

ZONE E CLAY
GRAY, GREENISH BLUE, FRANGE MOTTLED UP TO 10% FINE SAND.



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GEOLOGIC PROFILE ALONG PRINCIPAL SPILLWAY TRENCH



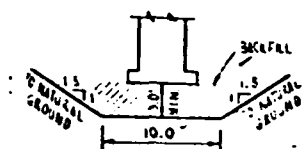
24" INSIDE DIA. CONCRETE WATER PIPE
 10'-3" SECTIONS
 6'-0" SECTION
 SPIGOT RING WALL FITTING
 12A & 12" WALL
 TOTAL 167.33' 167.9' FINAL LENGTH
 PRESSURE HEAD = 22'
 LOAD = 27.25' LBS PER LIN FT BASED ON OD OF 27"
 MIN 3 EDGE BEARING STRENGTH FOR 0.001" CRACK (PRESTRESSED PIPE) = 1.85 PER LIN FT.
 MIN 3 EDGE BEARING STRENGTH FOR 0.01" CRACK (NON-PRESTRESSED PIPE) = 5.20 LBS. PER LIN FT.

PIPE SUPPLIERS NOTE:
 CAST OUTSIDE OF SPIGOT JOINT RING WITH CONCRETE ON ONE 16" SECTION

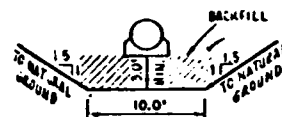
SPECIAL JOINT
 SEE SHEET 3

INVERT ELEV 2407.0

OUTLET CHANNEL SLOPE - 0.008 FTH
 APPROX 3.0' LONG

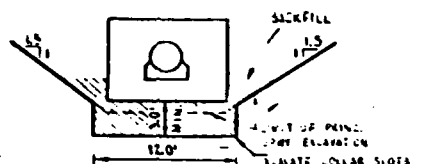


TYPICAL SECTION OF
 RISER EXCAVATION



TYPICAL SECTION OF
 PRINCIPAL SPILLWAY EXCAVATION

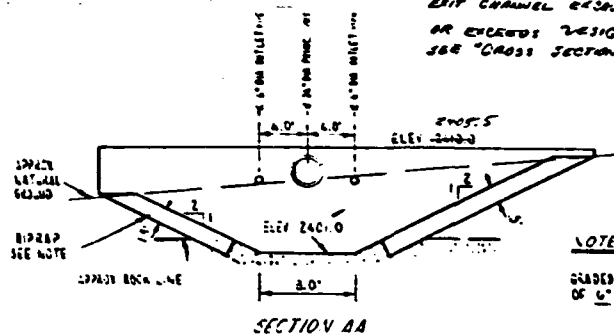
NOTE FOR BACKFILL MATERIAL. SEE SEC DD SHEET 5
 PRINCIPAL SPILLWAY TRENCH EXCAVATION EQUALS OR EXCEEDS DESIGN SECTION. SEE CROSS SECTION FOR PAYMENT.



TYPICAL SECTION OF
 ANTI-SEEP COLLAR EXCAVATION



TYPICAL SECTION OF
 OUTLET CHANNEL EXCAVATION
 EXIT CHANNEL EXCAVATION EQUALS OR EXCEEDS DESIGN SECTION. SEE "CROSS SECTIONS FOR PAYMENT"



NOTE:
 RIPRAP SHALL BE WELL GRADED TO A MINIMUM SIZE OF 6" TO A MAXIMUM OF 18"

| STATION | INVERT ELEV | INVERT ELEV OF 24" PIPE @ B OF COLLAR |
|---------|-------------|---------------------------------------|
| 1+00 | 2407.45 | 2407.45 |
| 1+20 | 2407.37 | 2407.37 |
| 1+40 | 2407.32 | 2407.32 |
| 1+60 | 2407.25 | 2407.25 |

| JOINT | TOTAL CUMULATIVE RISER WALL FITTING | INVERT ELEV OF 24" PIPE | AS BUILT ELEV. |
|-------|-------------------------------------|-------------------------|----------------|
| 1+00 | 0 | 2407.45 | 7.47 |
| 1+20 | 2 | 2407.37 | 7.51 |
| 1+40 | 22 | 2407.32 | 7.46 |
| 1+60 | 22 | 2407.25 | 7.39 |
| 1+80 | 36 | 2407.24 | 7.26 |
| 2+00 | 10 | 2407.20 | 7.29 |
| 2+20 | 86 | 2407.16 | 7.25 |
| 2+40 | 122 | 2407.11 | 7.20 |
| 2+60 | 118 | 2407.14 | 7.15 |
| 2+80 | 134 | 2407.10 | 7.10 |
| 3+00 | 150 | 2407.05 | 7.04 |
| 3+20 | 160 | 2407.00 | 7.00 |

NOTE:
 ABOVE DIMENSIONS FOR LENGTHS OF PIPE ARE NOMINAL & DO NOT INCLUDE CREED.

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AS BUILT

DESCRIPTION

- TOPSOIL
- CLAY: SANDSTONE & SILTSTONE FRAG FROM 1/4" x 1/8" x 1/8" TO 3/4" x 1/2" x 1/2" SCATTERED THROUGHOUT SECTION. CONSISTENCY VARIES FROM SOFT TO HARD. SEEP LINE IS ASSOCIATED WITH CONTACT BETWEEN "B" NEW "B" ZONE B WITH CONTACT BETWEEN CLAY B UNDERNEATH SANDSTONE, SILTSTONE, & SHALE
- BROKEN ROCK ZONE: LARGE (UP TO 2' x 1' x 1') BLOCKS OF SANDSTONE & SILTSTONE IN CLAY (CLAY WITH B BLOCKS MAKE UP 80% OF MATERIAL ZONE IS HIGHLY PERMEABLE)
- SANDSTONE: SILTSTONE, & SHALE BEDS, THIN-BEDDED WITH LESS THAN 1% OF BLK'S OVER 6" THICK. BEDS DIP SLIGHTLY DOWNSTREAM AT 5% & 8% SLOPES & INTERSECT THE BOTTOM OF TRENCH IN ALL SECTIONS NEARLY PARALLEL TO THE E OF THE STRUCTURE. ALL UNDERNEATH MATERIAL CAN BE DUG WITH A 24" HERMAN SPOON ON A FORD TRACTOR

LEGEND

WATER SEEPAGE

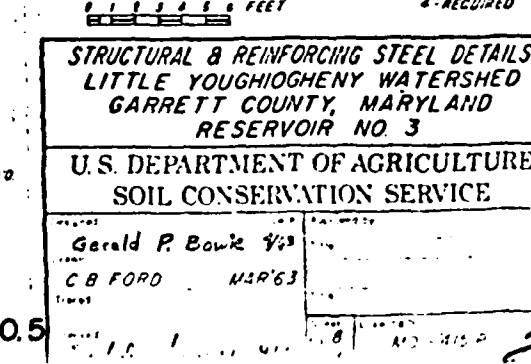
SECT THRU PRINCIPAL SPILLWAY- OUTLET CHANNEL
 LITTLE YOUGHIOGHENY WATERSHED
 GARRETT COUNTY, MARYLAND
 RESERVOIR NO. 3

U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

| | |
|------------------------------|-----|
| Garrett County | 143 |
| Little Youghiohony Reservoir | 143 |
| Outlet Channel | 143 |
| AS BUILT | 143 |

MML-4

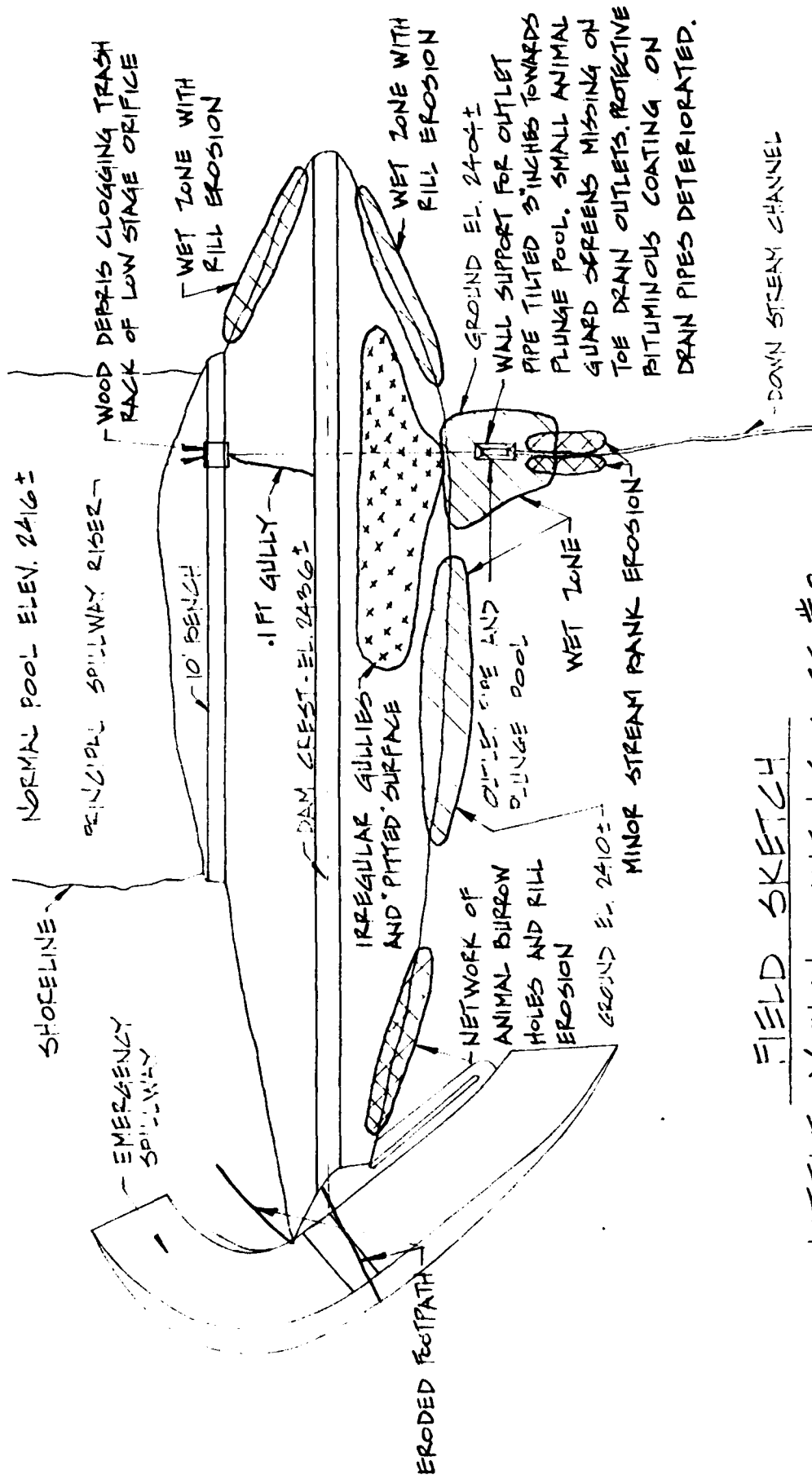
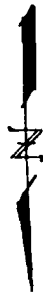
ALL EXPOSED EDGES OF CONCRETE TO HAVE
A 30° CHAMFER UNLESS OTHERWISE NOTED.



| | | |
|----------|--------|--|
| C B FORD | MAR'63 | |
| 1009 | | |
| | | |
| | | |

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APPENDIX A
FIELD SKETCH AND VISUAL OBSERVATIONS CHECKLIST



FIELD SKETCH
LITTLE YOUGHIOGENY SITE #3

CHECK LIST
VISUAL INSPECTION
PHASE I

Name Dam Little Youghiogheny #3 County Garrett State Maryland National ID # MD 45

Type of Dam Earthfill Hazard Category High, Class I

Date(s) Inspection 4/10/79 Weather Clear, Cool Temperature 50°F

Inspection Review Date 4/27/79

Pool Elevation at Time of Inspection *2,416 M.S.L. Tailwater at Time of Inspection *Normal M.S.L.
*Pool at riser orifice elevation

Inspection Personnel: Ackenheil & Associates Water Resources Admin. Soil Conservation Service

Timothy Debes
James Hainley
Michael McCarthy

Jeffrey Smith
Thomas Moynahan

Bill DeBarry
Walt Payte

Recorder Timothy Debes

EMBANKMENT

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|--|------------------------|---|
| SURFACE CRACKS | None observed. | |
| UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE | None observed. | Embankment slopes covered with a high stand of grass. |
| SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES | | The upstream slope has an eroded gully, about .1 ft. deep, leading to the principal spillway riser. Rill erosion is evident on downstream and abutment slopes. Past grazing activities have worn "pitted", irregular gullies on the downstream slope. |
| VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST | No misalignment noted. | |
| RIPRAP FAILURES | N/A | |

EMBANKMENT

| <u>VISUAL EXAMINATION OF</u> | <u>OBSERVATIONS</u> | <u>REMARKS OR RECOMMENDATIONS</u> |
|---|--|-----------------------------------|
| SETTLEMENT | None observed. | |
| JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM | Rill erosion evident on abutment junctions. | |
| ANY NOTICEABLE SEEPAGE | None observed. | |
| STAFF GAGE AND RECORDER | N/A | |
| DRAINS | The protective bituminous coating on the two 6 in. dia. toe drains has deteriorated, exposing metal pipe surfaces. These drains have a clear discharge at the rate of 1 gpm. Small animal guard screens are missing on both outlet drain pipes. A 4 inch dia. C.I. drain pipe is located on the left abutment side of the plunge pool. | |

UNGATED SPILLWAY

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|-----------------------|--------------|---|
| CONCRETE WEIR | N/A | |
| APPROACH CHANNEL | | The approach channel is free of debris, erosion, and obstructions. The channel is cut into natural earth and is vegetated with a low grass. |
| DISCHARGE CHANNEL | | The discharge channel is cut into natural earth, has a low grass cover, and empties into Wilson Run, approximately 200 ft. downstream of the dam. |
| BRIDGE AND PIERS | | Wilson Run underpasses Eighth Street through a 48 in. dia. R. C. pipe. Eighth Street is located 300 ft. downstream of the outlet pipe. |

OUTLET WORKS

(Pond Drain)

| <u>VISUAL EXAMINATION OF</u> | <u>OBSERVATIONS</u> | <u>REMARKS OR RECOMMENDATIONS</u> |
|--|--|-----------------------------------|
| CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT | None observed. | |
| INTAKE STRUCTURE | Wood debris partially blocking low stage trash rack. Gate valve was exercised and found operable. Gate stem and collar supports appeared rusty. | |
| OUTLET STRUCTURE | A concrete support wall, keyed into the outlet pipe concrete cradle, shows evidence of movement towards the plunge pool. A three (3) inch offset was measured between the concrete form breaks of the two structures. | |
| OUTLET CHANNEL | The outlet plunge pool is lined with riprap and was observed free of debris and other obstructions. The plunge pool empties into the original channel bed of Wilson Run, approximately 30 ft. downstream of the outlet pipe. | |
| EMERGENCY GATE | N/A | |

GATED SPILLWAY

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|----------------------------------|--------------|----------------------------|
| CONCRETE SILL | N/A | |
| APPROACH CHANNEL | N/A | |
| DISCHARGE CHANNEL | N/A | |
| BRIDGE AND PIERS | N/A | |
| GATES AND OPERATION EQUIPMENT | N/A | |

INSTRUMENTATION

| <u>VISUAL EXAMINATION OF</u> | <u>OBSERVATIONS</u> | <u>REMARKS OR RECOMMENDATIONS</u> |
|------------------------------|---------------------|-----------------------------------|
| MONUMENTATION/SURVEYS | None | |
| OBSERVATION WELLS | None | |
| WEIRS | None | |
| PIEZOMETERS | None | |
| OTHER | N/A | |

RESERVOIR

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|-----------------------|--|----------------------------|
| SLOPES | Reservoir slopes are generally flat and are predominately covered by open pasture and cropland. No evidence of shoreline erosion or sloughing of slopes. | |
| SEDIMENTATION | Reservoir water and outlet pipe discharge was free of noteable turbidity. No excessive sedimentation was observed. | |

DOWNSTREAM CHANNEL

| VISUAL EXAMINATION OF | OBSERVATIONS | REMARKS OR RECOMMENDATIONS |
|---|--|----------------------------|
| CONDITION (OBSTRUCTIONS, DEBRIS, ETC.) | A 48 in. dia. culvert . underpass is located 300 ft. below the dam. No debris or flow obstructions observed. | |
| SLOPES | Channel banks are partially vegetated with short grasses. Wilson Run has a slope gradient of about 1 per cent. | |
| APPROXIMATE NO. OF HOMES AND POPULATION | Wilson Run flows through the downtown section of Oakland, Maryland which has a population exceeding 1,800 residents. About sixteen (16) residential and commercial establishments are located within the downstream flood plain. | |

APPENDIX B

CHECKLIST ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION PHASE I

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

Little Youghiogeny
Dam Site No. 3

NAME OF DAM

ID # NDI ID #MD 45

| ITEM | REMARKS |
|---|--|
| AS-BUILT DRAWINGS | As-built drawings provided by Soil Conservation Service. See plates 1 through 5. |
| REGIONAL VICINITY MAP | See Appendix E. U.S.G.S. 7.5 minute quadrangle map showing dam site location. |
| CONSTRUCTION HISTORY | Designed by Soil Conservation Service, construction was started in July 1964 and completed June 1965. Soil Conservation Service supervised construction. |
| TYPICAL SECTIONS OF DAM | See plates 2 and 4 for details of earthfill embankment and cutoff trench. |
| OUTLETS - PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS | See plates 4 and 5 for details of principal spillway intake and outlet works. Available in design report. |
| RAINFALL/RESERVOIR RECORDS | Not available. |

| ITEM | REMARKS |
|---|---|
| DESIGN REPORTS | Little Youghiogheny River Watershed, Site No. 3, design report prepared by Soil Conservation Service, April 3, 1963. |
| GEOLOGY REPORTS | Detailed geology report included in the above design report. Report prepared by Neville M. Curtis, Jr., Geologist, August 9, 1962. |
| DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES | Hydrology and hydraulic design calculations and static slope stability calculations can be found in design report prepared by Soil Conservation Service. |
| MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD | See plate 2 for typical subsurface profile. Test boring and test pit log data provided in design report and on design drawings. Laboratory soil test data includes shear strength, natural and compacted densities and classification descriptions. |
| POST-CONSTRUCTION SURVEYS OF DAM | None reported. |
| BORROW SOURCES | Borrow sources were located within the proposed reservoir limits. |

| ITEM | REMARKS |
|---|--|
| MONITORING SYSTEMS | None |
| MODIFICATIONS | None reported. |
| HIGH POOL RECORDS | None recorded. |
| POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS | None reported. |
| PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS | None reported. |
| MAINTENANCE OPERATION RECORDS | Annual Maintenance and Operation Inspection reports available from Soil Conservation Service, District Office in Oakland, MO. |

| ITEM | REMARKS |
|--|--|
| SPILLWAY PLAN | See plate 1 for details of spillway construction. |
| SECTIONS | |
| DETAILS | |
| OPERATING EQUIPMENT PLANS & DETAILS | See plate 5 for details of gate valve and reservoir drain construction. |
| SPECIFICATIONS | <u>Construction and Material Specifications for Little Youghiogheny River Watershed, Flood Detention Structure No. 3, prepared by U.S. Department of Agriculture.</u> |
| MISCELLANEOUS | <ol style="list-style-type: none"> 1. Construction Permit, Little Youghiogheny Dam Site No. 3. 2. Engineers Cost Estimate of construction quantities. 3. Operation and Maintenance inspection reports, prepared by S.C.S. |

APPENDIX C
CHECKLIST HYDROLOGIC AND
HYDRAULIC ENGINEERING DATA

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: More than 60% open pasture and croplands,
about 16% of area is farm and urban development.

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 2,416.0 ft. (17 ac.-ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 2,436 ft. (374 ac.-ft.)

ELEVATION MAXIMUM DESIGN POOL: 2,431 ft.

ELEVATION TOP DAM: 2,436 ft.

EMERGENCY SPILLWAY

- a. Elevation 2,428 ft.
- b. Type Vegetated earth channel
- c. Width 50 ft.
- d. Length 350 ft.
- e. Location Spillover North abutment
- f. Number and Type of Gates None

OUTLET WORKS

- a. Type concrete intake structure and 24 in. dia. R. C. pipe
- b. Location 160 ft. from the south abutment
- c. Entrance Inverts Low stage El. 2416 ; High stage El. 2419.5
- d. Exit Inverts El. 2,407
- e. Emergency Draindown Facilities 8 in. dia. gate valve, housed in principal spillway riser, limited capacity.

HYDROMETEOROLOGICAL GAGES

- a. Type None
- b. Location N/A
- c. Records None

MAXIMUM NON-DAMAGING DISCHARGE Unknown

APPENDIX D

PHOTOGRAPHS

PHOTOGRAPH 1 Overview of dam crest and emergency spillway channel in background.

PHOTOGRAPH 2 Overview of upstream embankment slope. Note eroded gully on spillway abutment (right foreground of photograph).

PHOTOGRAPH 3 Overview of downstream embankment slope.

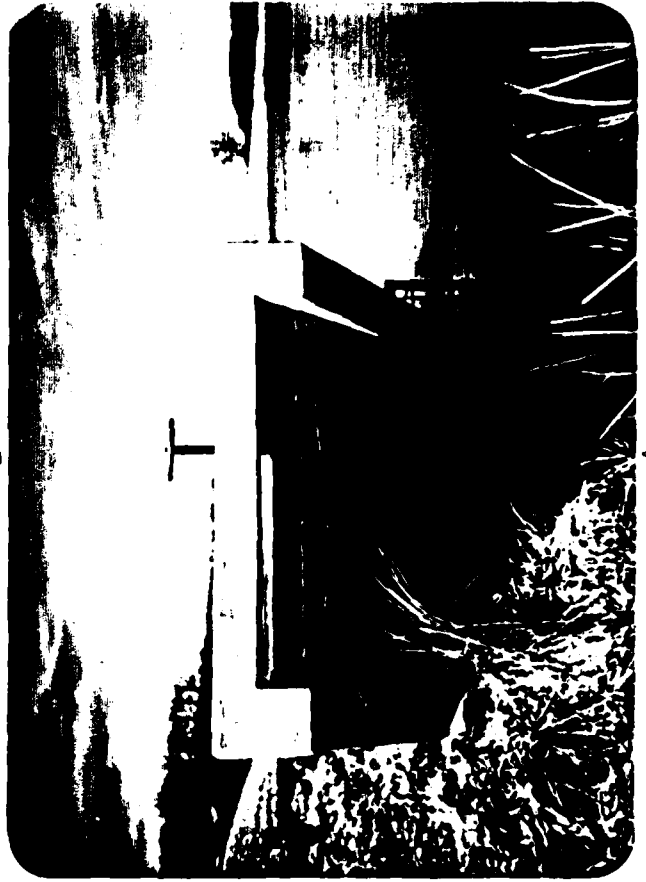
PHOTOGRAPH 4 Close up view of principal spillway riser.



2



3



4

PHOTOGRAPH 5 View of outlet pipe, toe drain pipe and wall support system.

PHOTOGRAPH 6 Close up view of concrete pipe support cradle and wall bent displacement.

PHOTOGRAPH 7 Overview of outlet pipe and plunge pool.

PHOTOGRAPH 8 Overview of downstream channel and embankment erosion.



5



7



6



8

PHOTOGRAPH 9 View of emergency spillway inlet channel looking east.

PHOTOGRAPH 10 Overview of emergency spillway channel looking east.

PHOTOGRAPH 11 View of emergency spillway outlet channel looking west.

PHOTOGRAPH 12 Overview of downstream channel area and Eighth Street underpass.



9



10



11



12

APPENDIX E
REGIONAL LOCATION PLAN



D E: MAY 7, 1979

SCALE: 1:24000

DR: JLM CK: TED

DWG. NO. E1

NATIONAL DAM INSPECTION PROGRAM

ACKENHEIL & ASSOCIATES
CONSULTING ENGINEERS
BALTIMORE, MD.

LOCATION PLAN
OF LITTLE
YOUGHIOGHENY
SITE #8

APPENDIX F
REGIONAL GEOLOGY

LITTLE YOUGHIOGHENY RIVER DAM SITE NO. 3
NDI I.D. NO. MD 45
REGIONAL GEOLOGY

Little Youghiogheny River Site No. 3 is located in the Allegheny Plateau Physiographic Province. The predominant macrostructure of the region is the northeast trending Deer Park Anticline, which extends through eastern Garrett County into Pennsylvania.

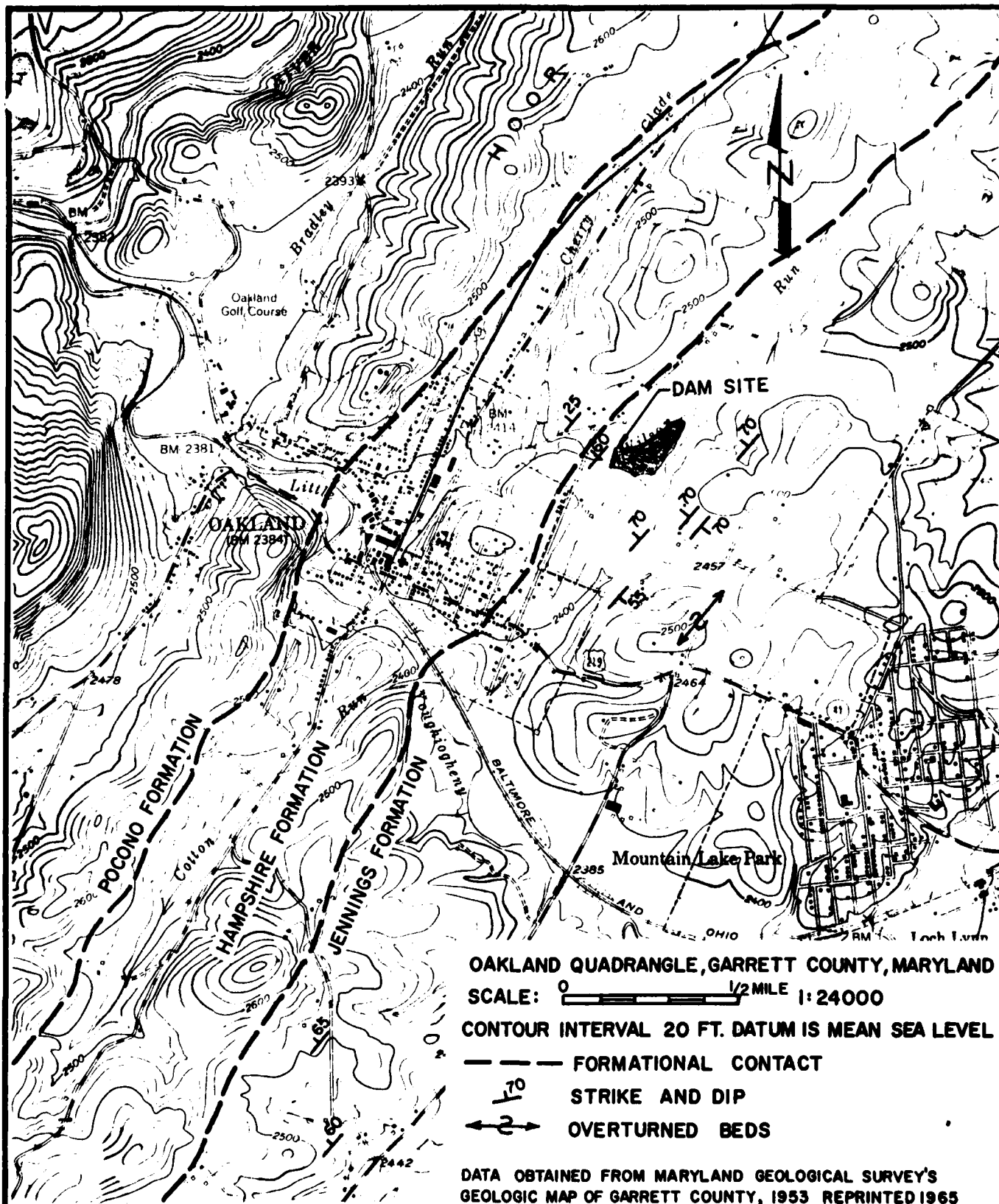
The dam site is structurally situated on the western flank of the Deer Park Anticline within the Jennings Formation. It is located approximately .1 mile east of the Hampshire Formation contact and .7 mile east of the Pocono Formation. The Hampshire and Pocono Formations consist of sandstone, alternating with beds of shale, and strongly cross-bedded sandstone, interbedded with siltstones and shales, respectively. The Upper Devonian, Jennings Formation consists of interbedded marine shales, sandstones, and siltstones. This formation is exposed in a belt 3 - 5 miles wide, and forms the central section of the Deer Park Anticline. Minor folding is abundant in the mesostructure of the Jennings Formation.

The bedding at the dam site strikes approximately N 40° E and dips as follows: 70° NW, 1,000 ft. east of the site; 60° NW near the plunge pool, and 25° NW, 1,500 ft. west of the site.

A broken rock zone overlies the competent rock of the Jennings Formation at the site. This zone, erratic in distribution, approximates a lens which ranges up to 2.5 ft. in thickness. Water seepage was reportedly encountered in test pits within this zone. Seepage was also observed along contacts with the overlying clays and underlying sandstone, siltstone, and shale beds.

References

- Maryland Geological Survey, 1953, reprinted 1965, Geologic Map of Garrett County.
- Maryland Geological Survey, revised 1961, reprinted 1966, Bulletin 19, Geography and Geology of Maryland.
- Curtis, Neville M., Jr., and Harrington, Joseph H., 1962, Geological Report of Little Youghiogheny Watershed Site No. 3.



| | | | |
|-------------------|---------|--|--|
| DATE: MAY 7, 1979 | | NATIONAL DAM INSPECTION PROGRAM | SITE GEOLOGY OF LITTLE YOUGHIOGHENY SITE #3 |
| SCALE: AS SHOWN | | | |
| DR: JLM | CK: TED | ACKENHEIL & ASSOCIATES CONSULTING ENGINEERS BALTIMORE, MD. | |
| DWG. NO. F2 | | | |